Oak Ridge Health Study Document Summary Form

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KEYWORDS: stack, release, graphite reactor

ABSTRACT:

Gross beta and gross alpha activity (as highest average per 24 hours and average for period) released from the continuous stack monitors installed on the 3039, 3020, and graphite reactor stacks. Describes the sampling equipment used.

ChemRisk Document No. 2567

REVIEWER: GM Bruce DATE REVIEWED: 4/1/96

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November 20, 1995

Steve Wiley
Y-12
Bldg. 9106
MS-8023

Dear Steve:

Enclosed are two documents from Director's Files that were requested by Gretchen Bruce for the HSA Project:

"Considerations Concerning Concentrations of Radioactivity in Stack Effluents," 3/20/58
"ORNL Wastes Entering Poplar Creek," 5/31/60

Dave Hamrin asked me to forward them to you for document clearance and release for Y-12. Please return, as one of the documents has to be cleared by K-25 also.

Thanks for your time and trouble,

Teresa Welsh

Teresa Welsh
Laboratory Records
Bldg. 4500N
MS-6285

MSR-AFR

X-847

INTRA-LABORATORY CORRESPONDENCE

OAK RIDGE NATIONAL LABORATORY

March 25, 1958

To: J. A. Swartout

One of our recent discussions involved stack monitoring. The attached memo will serve to inform you that we have set up interim measures for monitoring stack effluents pending a more elaborate and complete development.

J. C. Hart

JCH:mfm

Attachment: RS-AI Memo 101-58

cc: A. M. Weinberg
C. E. Winters
R. A. Charpie

KZ. Morgan Files at X-10

Air Contamination

2567

OAK RIDGE NATIONAL LABORATORY
Health Physics Division

RS-AI Memo 101-58
March 20, 1958

Considerations Concerning Concentrations of Radioactivity in Stack Effluents

Continuous stack monitors have been installed on the 3039, 3020, and graphite reactor stacks. The equipment at the 3039 stack consists of a conventional LaPine motor blower unit which draws air from the stack stream through a millipore filter. At the 3020 stack, the sample is drawn from the stack stream through a millipore filter by means of a steam jet arrangement. The sample at the graphite reactor is drawn from the duct downstream from the filter house and uses the pressure differential across the fan to draw the sample through H.V. 70 filter paper. Mounted just below the H.V. 70 filter paper in a shielded box is a GM tube monitoring the activity collected on the filter with the counting rate being recorded on an Esterline Angus recorder.

The filters are changed daily at each stack and evaluated for gross beta and gross alpha activity. The data presented is calculated from samples covering a minimum of one month of sample collection. Average concentration values for gross beta and gross alpha activity have been calculated for each stack concerned. In addition, the highest average value for any 24 hour period has been calculated. These values are presented in tabular form below.

Concentration of Radioactivity in Stack Effluents

	Stack		
	3020	3039	Graphite Reactor
Gross Beta			
Highest Average per 24 hours	1.1×10^{-8} μc/cc	9.1×10^{-9} μc/cc	9.5×10^{-8} μc/cc
Average for Period	3.2×10^{-9} μc/cc	9.3×10^{-10} μc/cc	3.9×10^{-9} μc/cc
Gross Alpha			
Highest Average per 24 hours	1.5×10^{-10} μc/cc	5.5×10^{-11} μc/cc	1.3×10^{-12} μc/cc
Average for Period	2.4×10^{-11} μc/cc	2.6×10^{-11} μc/cc	3.4×10^{-14} μc/cc

From the above average gross beta values, probable maximum ground concentrations were determined using curves prepared from Sutton's equations.(1) A summation of the probable ground maximums compares favorably with the observed values determined by conventional area monitoring techniques.

The average values listed in the table may be considered probable normal operating levels. When concentrations of activity in the stacks exceed these values, we would recommend that the values found meet the test set forth by the following expression:

$$3\left[\frac{C_\beta \times 10^{-2}}{MPC_\beta} + \frac{C_\alpha \times 10^{-2}}{MPC_\alpha}\right] < 1$$

C_α = Gross alpha concentration in stack effluent

C_β = Gross beta concentration in stack effluent

MPC_β = Breathing zone MPC for gross beta activity

MPC_α = Breathing zone MPC for gross alpha activity

The factor of 3 was applied to compensate for the fact that there are three major stacks emitting activity. Each term is multiplied by a dilution factor (10^{-2}) to allow for comparison of stack concentrations and breathing zone MPC values.

If the left hand term of the expression is greater than one, but less than ten the condition should be investigated. Identification of specific isotopes, considering their particular MPC values, may reduce the quantity of the left hand term to an acceptable value. If this is not the case, remedial action should be taken. Should the value of the left hand term exceed ten, remedial action should be taken immediately with investigation to follow.

A. D. Warden

A. D. Warden

HHA:WDC:mfm

Distribution: C

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(1) (Unpublished)"Calculations for Unit Emissions of Airborne Contaminants", by R. F. Myers and D. R. Purdy, U. S. Weather Bureau, Oak Ridge, Tennessee